APPENDIX D
ENVIRONMENTAL JUSTICE

D.1 INTRODUCTION

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* (59 FR 7629), directs Federal agencies to identify and address, as appropriate, disproportionately high and adverse health or environmental effects of their programs, policies, and activities on minority populations and low-income populations.

The Council on Environmental Quality (CEQ) has oversight responsibility for documentation prepared in compliance with the National Environmental Policy Act (NEPA). In December 1997, CEQ released its guidance on environmental justice under NEPA (CEQ 1997). The CEQ guidance was adopted as the basis for the analysis of environmental justice contained in this *Environmental Impact Statement for the Chemistry and Metallurgy Research Building Replacement Project at Los Alamos National Laboratory (CMRR EIS).*

This appendix provides an assessment of the potential for disproportionately high and adverse human health or environmental effects on minority and low-income populations resulting from the implementation of the alternatives described in Chapter 2 of this EIS.

D.2 DEFINITIONS

Minority Individuals and Populations

The following definitions of minority individuals and populations were used in this analysis of environmental justice:

- **Minority individuals—**Individuals who are members of the following population groups: Hispanic or Latino, American Indian or Alaska Native, Asian, Black or African American, Native Hawaiian or Other Pacific Islander, or two or more races. This definition is similar to that given in the CEQ environmental justice guidance (CEQ 1997), except that it has been modified to reflect *Revisions to the Standards for the Classification of Federal Data on Race and Ethnicity* (62 FR 58782) and recent guidance (OMB 2000) published by the Office of Management and Budget. These revisions were adopted and used by the Census Bureau in collecting data for Census 2000. When data from the 1990 census are used, a minority individual will be defined as someone self-identified as: Hispanic; American Indian, Eskimo, or Aleut; Asian or Pacific Islander; or Black. As discussed below, racial and ethnic data from the 1990 census cannot be directly compared with that from Census 2000.

  The Office of Management and Budget has also recommended that persons self-identified as multi-racial should be counted as a minority individual if at least one of the races is a minority race (OMB 2000). During Census 2000, approximately two percent of the

population identified themselves as members of more than one race (DOC 2001a). Approximately two-thirds of those designated themselves as members of at least one minority race.

- **Minority population—**Minority populations should be identified where either: (a) the minority population of the affected area exceeds 50 percent, or (b) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis. In identifying minority communities, agencies may consider as a community either a group of individuals living in geographic proximity to one another, or a geographically dispersed and transient set of individuals (such as migrant workers or American Indians/Alaska Natives), where either type of group experiences common conditions of environmental exposure or effect. The selection of the appropriate unit of geographic analysis may be a governing body's jurisdiction, a neighborhood, census tract, or other similar unit that is to be chosen so as to not artificially dilute or inflate the affected minority population. A minority population also exists if there is more than one minority group present and the minority percentage, as calculated by aggregating all minority persons, meets one of the above-stated thresholds.

In the discussions of environmental justice in this EIS, persons self-designated as Hispanic or Latino are included in the Hispanic or Latino population, regardless of race. For example, the Asian population is composed of persons self-designated as Asian and not of Hispanic or Latino origin. Asians who designated themselves as having Hispanic or Latino origins are included in the Hispanic or Latino population. Data for the analysis of minority populations in 2000 were extracted from the U.S. Census Bureau's Summary File 1 (DOC 2001b).

Low-Income Populations and Individuals

Executive Order 12898 specifically addresses "disproportionately high and adverse effects" on "low-income" populations. The CEQ recommends that poverty thresholds be used to identify "low-income" individuals (CEQ 1997).

The following definition of low-income population was used in this analysis:

- **Low-income population—**Low-income population in an affected area should be identified with the annual statistical poverty thresholds from the U.S. Census Bureau's *Current Population Reports, Series P–60 on Income and Poverty*. In identifying low-income populations, agencies may consider as a community either a group of individuals living in geographic proximity to one another, or a set of individuals (such as migrant workers or American Indians/Alaska Natives), where either type of group experiences common conditions of environmental exposure or effect (CEQ 1997).

Data for the analysis of low-income populations were extracted from the U.S. Census Bureau's Summary File 3 (DOC 2002a).

Disproportionately High and Adverse Human Health Effects

Adverse health effects are measured in risks and rates that could result in latent cancer fatalities, as well as other fatal or nonfatal adverse impacts to human health. Disproportionately high and adverse human health effects occur when the risk or rate of exposure to an environmental hazard for a minority population or low-income population is significant and exceeds the risk of exposure rate for the general population or for another appropriate comparison group (CEQ 1997).

Disproportionately High and Adverse Environmental Effects

A disproportionately high environmental impact refers to an impact or risk of an impact in a low-income or minority community that is significant and exceeds the environmental impact on the larger community. An adverse environmental impact is an impact that is determined to be both harmful and significant. In assessing cultural and aesthetic environmental impacts, impacts that uniquely affect geographically dislocated or dispersed or minority low-income populations are considered (CEQ 1997).

Potentially affected areas examined in this EIS include areas defined by a 50-mile (80-kilometer) radius centered on candidate facilities for chemical and metallurgy research (CMR) activities. Potentially affected areas used in the analysis of environmental justice are the same as those used in the analysis of radiological health effects described in Chapter 4.

D.3 SPATIAL RESOLUTION

For the purposes of enumeration and analysis, the Census Bureau has defined a variety of areal units (DOC 2002b, Appendix F). Areal units of concern in this document include (in order of increasing spatial resolution) states, counties, census tracts, block groups, and blocks. The "block" is the smallest of these entities and offers the finest spatial resolution. This term refers to a relatively small geographical area bounded on all sides by visible features such as streets and streams or by invisible boundaries such as city limits and property lines. During the 2000 census, the Census Bureau subdivided the United States and its territories into 8,269,131 blocks (DOC 2002b, Appendix F). For comparison, the number of counties, census tracts, and block groups used in the 2000 census were 3,232; 66,304; and 211,267, respectively. While blocks offer the finest spatial resolution, economic data required for the identification of low-income populations are not available at the block level of spatial resolution. In the analysis below, block-level resolution is used to identify minority populations and block-group-level resolution is used to identify low-income populations.

Boundaries of the areal units are selected to coincide with features such as streams and roads or political boundaries such as county and city borders. Boundaries used for aggregation of the census data usually do not coincide with boundaries used in the calculation of health effects. As discussed in Chapter 4, radiological health effects due to an accident at each of the sites considered for the proposed actions are evaluated for persons residing within a distance of 50 miles (80 kilometers) of an accident site. In general, the boundary of the circle with a 50-mile (80-kilometer) radius centered at the accident site would not coincide with boundaries used by

the Census Bureau for enumeration of the population in the potentially affected area. Some blocks or block groups lie completely inside or outside of the radius used for health effects calculation, while others are only partially included. As a result of these partial inclusions, uncertainties are introduced into the estimate of the population at risk from the accident.

In order to estimate the populations at risk in partially included block groups, it was assumed that populations are uniformly distributed throughout the area of each block group. For example, if 30 percent of the area of a block or block group lies within 50 miles (80 kilometers) of the accident site, it was assumed that 30 percent of the population residing in that block or block group would be at risk.

D.4 Environmental Justice Analysis

This analysis of environmental justice concerns is based on the assessment of the environmental impacts reported in Chapter 4. This analysis was performed to identify any disproportionately high and adverse human health or environmental impacts on minority or low-income populations surrounding the candidate sites. Demographic information obtained from the Census Bureau was used to identify the minority populations and low-income communities in the zone of potential impact surrounding the sites (DOC 2001b, DOC 2002a). Data from Census 2000 were used to identify populations at risk in potentially affected counties.

As discussed in Chapter 2, three technical areas at LANL are associated with the relocation of CMR operations (see **Figure D–1**): (1) TA-3, the location of the existing CMR Building; (2) TA-55, the proposed location for the new CMRR Facility; and (3) TA-6, an alternative "Greenfield" location for the new CMRR Facility. All of the candidate locations are within approximately 1 mile (1.6 kilometers) of each other.

D.4.1 Results for the No Action Alternative

Under the No Action Alternative, CMR operations would continue at the existing CMR Building in TA-3 and no new facilities would be constructed. This section describes the low-income and minority populations living within the potentially affected area surrounding TA-3. It also describes the potential environmental impacts on those populations that could result from implementation of the No Action Alternative.

D.4.1.1 Minority Populations Surrounding TA-3

Figure D–2 shows the potentially affected area centered on Wing 9 of the existing CMR Building. It shows the counties at radiological risk and the composition of the population at risk in each county. The "population at risk" refers to all persons who reside within 50 miles (80 kilometers) of the existing CMR Building or the proposed locations for the new CMRR Facility at TA-55 and TA-6. The 50-mile (80-kilometer) distance was selected to correspond to the radius-of-effects for potential radiological health impacts. The counties at radiological risk are Bernalillo, Los Alamos, Mora, Rio Arriba, Sandoval, San Miguel, Santa Fe, and Taos.

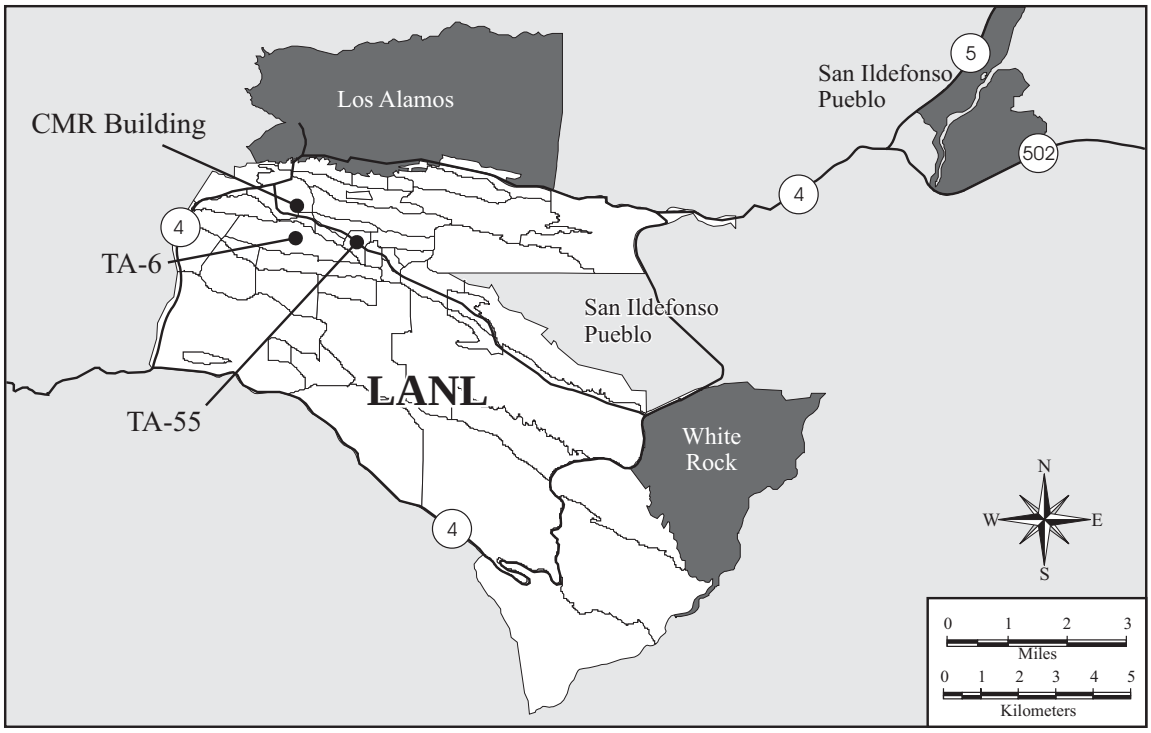

Figure D–1 CMR Building and Sites for the new CMRR Facility

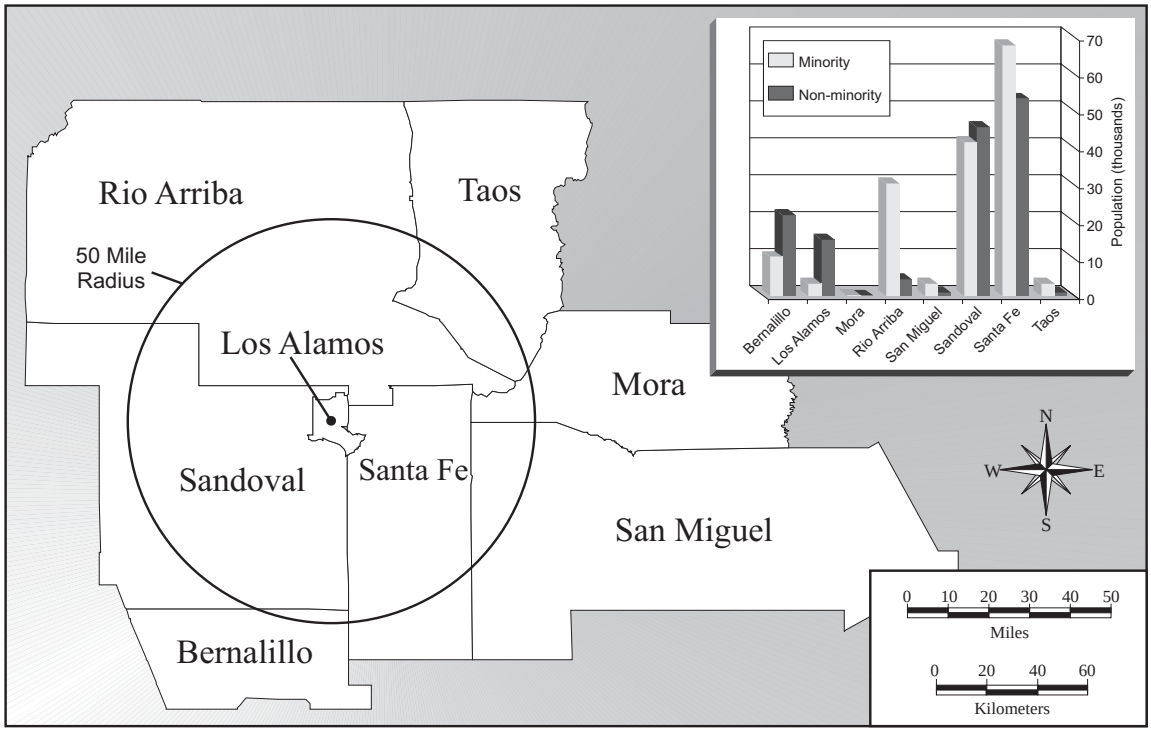

Figure D–2 Minority and Non-Minority Populations Living in Potentially Affected Counties Surrounding TA-3

Minority and non-minority populations living within the 50-mile (80-kilometer) distance from the existing CMR Building are shown as a bar graph for each potentially affected county.

Figure D–3 shows the composition of the minority population as a function of distance from the existing CMR Building. For the potentially affected area surrounding the existing CMR Building, the combined Hispanic or Latino and American Indian populations comprised 94 percent of the total potentially affected minority population in 2000. Moving outward from the location of the existing CMR Building, minority populations increase most noticeably near the outskirts of Española, Santa Fe, and Albuquerque. More than one-half of the potentially affected Hispanic or Latino population lived in the Española-Santa Fe area in the year 2000.

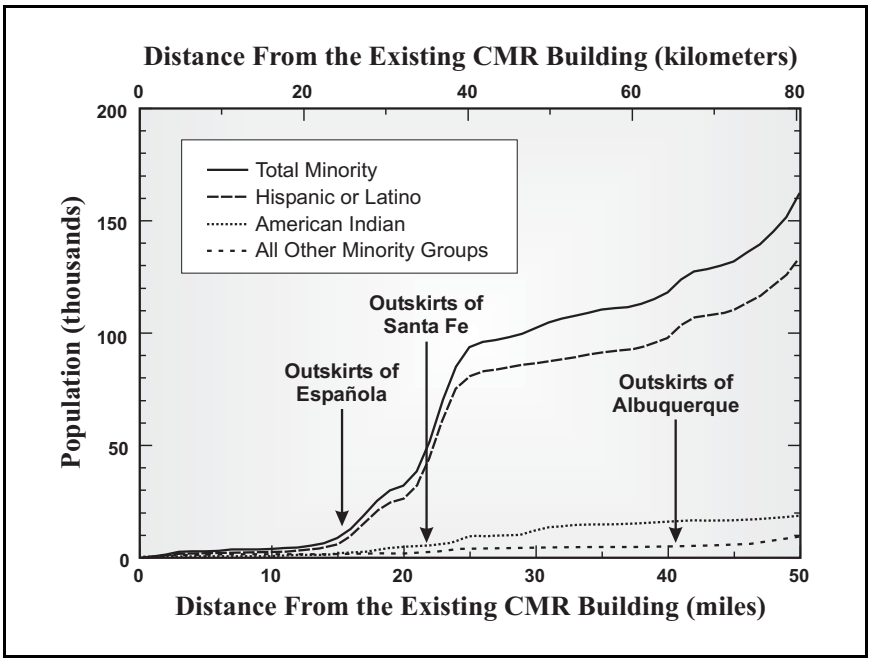

Figure D–3 Minority Populations as a Function of Distance from the Existing CMR Building

As shown in **Table D–1**, approximately 160,000 minority individuals lived within 50 miles (80 kilometers) of the existing CMR Building in the year 2000. Eighty-seven percent of the potentially affected minority population was resident in three of the eight potentially affected counties: Rio Arriba, Sandoval, and Santa Fe Counties.

Table D–1 Minority Populations Living in Potentially Affected Counties Surrounding the Existing CMR Building in the Year 2000

County	*Total Minority Population*	*Potentially Affected Minority Population*	*Percentage of the Totally Affected Minority Population*
Bernalillo	285,081	10,522	6.6
Los Alamos	3,235	3,235	2.0
Mora	4,293	118	< 0.1
Rio Arriba	35,404	30,309	18.9
San Miguel	24,332	3,256	2.0
Sandoval	44,165	41,635	26.0
Santa Fe	69,713	67,686	42.3
Taos	19,597	3,186	2.0
Total	485,820	159,947	100.0*

* Sum of individual percentages may not equal 100 percent due to roundoff.

D.4.1.2 Low-Income Populations Surrounding TA-3

Figure D–4 shows the counties at radiological risk from CMR activities in the existing CMR Building. Low-income and non-low-income populations living within the 50-mile (80-kilometer) distance from the existing CMR Building are shown as a bar graph for each potentially affected county. Eighty-seven percent of the potentially affected low-income population lives in three of the eight potentially affected counties: Rio Arriba, Sandoval, and Santa Fe (See **Table D–2**). Among the 33 counties in New Mexico, 4 of the potentially affected counties have the lowest percentages of their population with incomes below the poverty threshold: Bernalillo, Los Alamos, Sandoval, and Santa Fe.

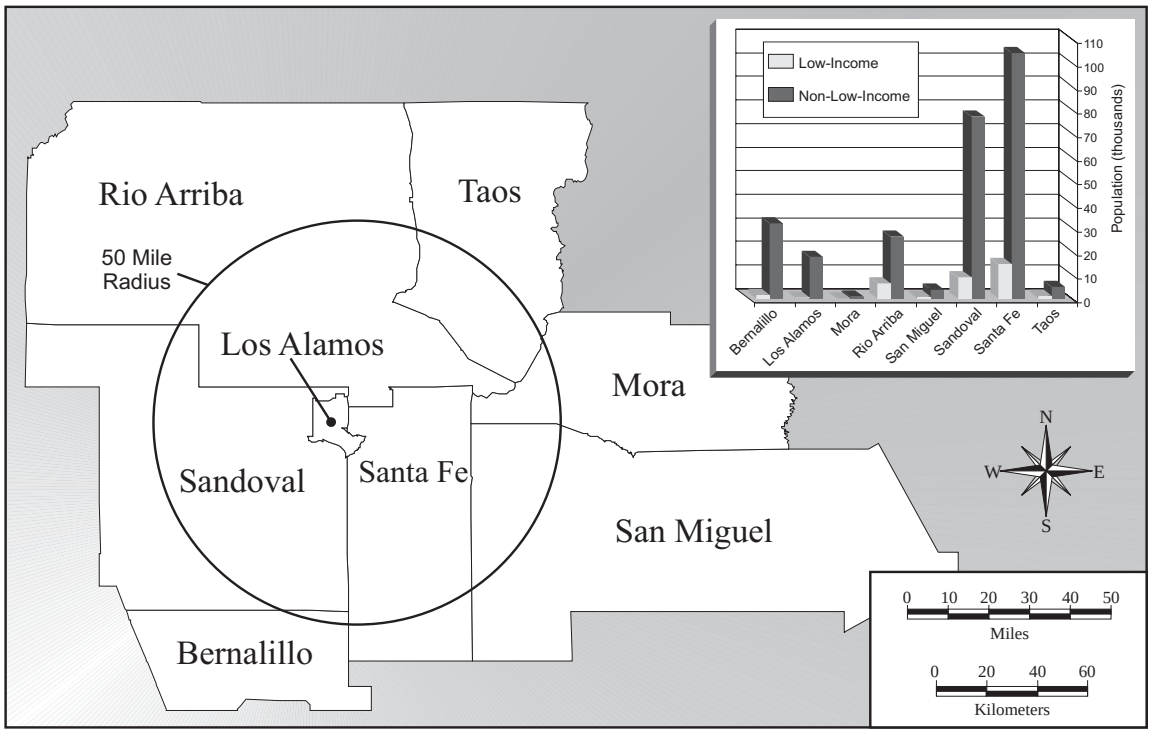

Figure D–4 Low-Income and Non-Low-Income Populations Living in Potentially Affected Counties Surrounding TA-3

Table D–2 Low-Income Populations Surrounding the Existing CMR Building by County

County	*Rank Among All New Mexico Counties (lowest percent poverty among the total county population)*	*Number of Low-Income Persons in County in 2000*	*Low-Income Population at Risk in 2000*	*Percent of the Total Low-Income Population at Risk*
Bernalillo	4	74,987	1,623	4.7
Los Alamos	1	543	543	1.5
Mora	28	1,305	265	0.8
Rio Arriba	18	8,303	6,509	18.6
San Miguel	25	7,110	846	2.4
Sandoval	3	10,847	9,266	26.4
Santa Fe	2	15,241	14,742	42.0
Taos	19	6,232	1,284	3.7

Figure D–5 shows the low-income population surrounding TA-3 as a function of distance from the existing CMR Building. Moving outward from the location of the existing CMR Building, low-income populations increase most noticeably near the outskirts of Española, Santa Fe, and Albuquerque. Approximately one-half of the low-income population lives within 25 miles (40 kilometers) of the existing CMR Building.

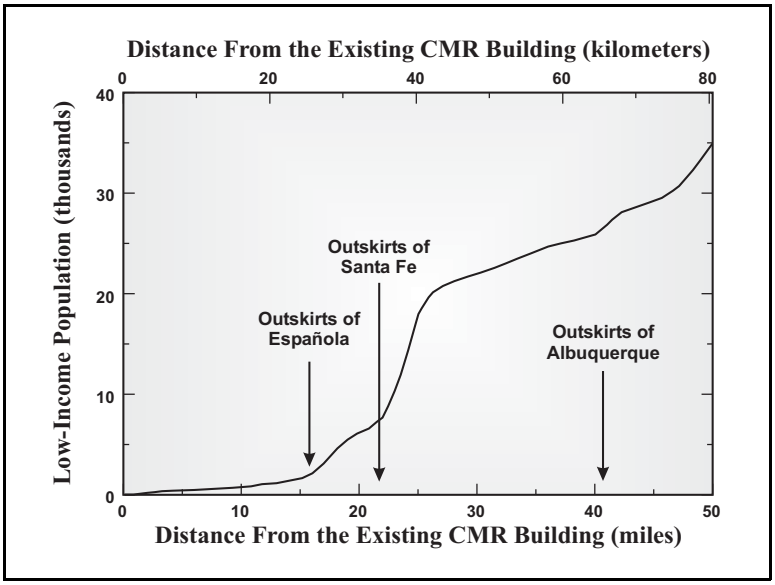

Figure D–5 Low-Income Population as a Function of Distance from the Existing CMR Building

D.4.1.3 Impacts of the No Action Alternative on Low-Income and Minority Populations

Normal Operations

As discussed in Section 4.2.9.1 (see Table 4–3), the likelihood of a fatal cancer to the maximally exposed offsite individual under the No Action Alternative from normal operations would be less than approximately 1 chance in 13 million for each year of exposure. The risk of a latent cancer fatality occurring among the population surrounding the CMR Building would be approximately 1 chance in 2,000 for each year of exposure. Under normal operating conditions, the dose from radiological emissions from the CMR Building would be approximately a factor of 1,400 less than the dose from background radiation present in the potentially affected area surrounding the CMR Building. Also during normal operations under the No Action Alternative, chemical releases to the atmosphere would be less than EPA screening thresholds (40 CFR 68) that designate a hazard to human health.

Thus, normal operations under the No Action Alternative would pose no adverse radiological risk to persons residing in the potentially affected area surrounding the CMR Building, including minority and low-income persons. In addition, the special pathways analysis described in Section D.4.4 shows that CMR operations under the No Action Alternative would not pose an adverse risk to American Indians or others who depend upon subsistence hunting, fishing, and gathering.

Radiological and Chemical Accidents

The risks to the public from potential accidents under the No Action Alternative are discussed in Section 4.3.9.2 (Table 4–5). A severe earthquake would result in the largest radiological risk for the public and the maximally exposed offsite individual. These risks are approximately 1 chance in 500 per year of causing a latent cancer fatality (0.002 latent cancer fatalities) in the total population. Thus, for the accidents evaluated in this EIS under the No Action Alternative, no

latent cancer fatalities among the public would be expected to result from any of these accidents, including minority or low-income persons.

Quantities of toxic and carcinogenic chemicals that would be stored in the CMR Building under the No Action Alternative are less than EPA screening thresholds (40 CFR 68) that designate a hazard to human health. Accidents that could occur at the CMR Building under the No Action Alternative would not pose a chemical release hazard to the public, including minority and low-income persons.

Waste Generation and Management

Waste generated under the No Action Alternative would be the same as currently experienced at LANL. This is because waste generation during CMR operations would not change due to operational restrictions, and therefore, the same types and volumes of waste would be generated (see Section 4.2.11). Section 3.12.1 presents a discussion on the waste types and quantities generated by current CMR activities and compares the waste generated with LANL's available waste management capacities. All wastes currently generated are within LANL's capacity for handling waste. Continuation of CMR activities at the existing CMR Building would not be expected to adversely affect air or water quality, or to result in contamination of Tribal lands adjacent to the LANL boundary.

In summary, implementation of the No Action Alternative would not pose disproportionately high or adverse environmental risks to low-income or minority populations living in the potentially affected area surrounding the existing CMR Building.

D.4.2 Results for Action Alternatives 1 and 3

Under Alternatives 1 and 3, new laboratory building(s) would be constructed at TA-55 to house analytical chemistry and materials characterization activities that are currently conducted at the existing CMR Building. Under Alternative 1, a new administrative offices and support functions building would also be constructed at TA-55 and the existing CMR Building would be partly or totally dispositioned. Under Alternative 3, the existing CMR Building would continue to house administrative offices and support functions for CMR operations. This section describes the low-income and minority populations living within the potentially affected area surrounding TA-55. It also describes the potential environmental impacts on those populations that could result from implementation of Alternatives 1 and 3.

D.4.2.1 Minority Populations Surrounding TA-55

Figure D–6 shows the potentially affected area centered on the proposed location for a new CMRR Facility at TA-55. It shows the counties at radiological risk and the composition of the population at risk in each county. The "population at risk" refers to all persons who reside within 50 miles (80 kilometers) of the new CMRR Facility. The 50-mile (80-kilometer) distance was selected to correspond to the radius-of-effects for potential radiological health impacts. The counties at radiological risk are the same as those discussed under the No Action Alternative: Bernalillo, Los Alamos, Mora, Rio Arriba, Sandoval, San Miguel, Santa Fe, and Taos.

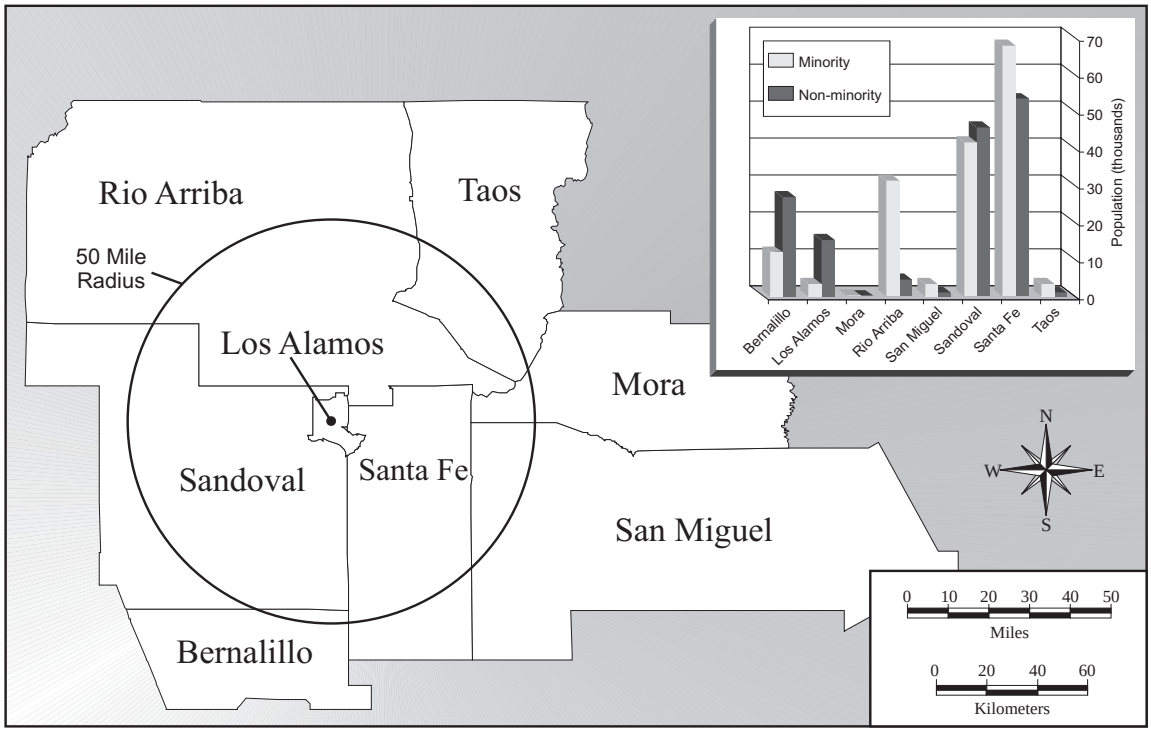

Figure D–6 Minority and Non-Minority Populations Living in Potentially Affected Counties Surrounding TA-55

Minority and non-minority populations living within the 50-mile (80-kilometer) distance from TA-55 are shown as a bar graph for each potentially affected county.

Figure D–7 shows the composition of the minority population as a function of distance from TA-55. The combined Hispanic or Latino and American Indian populations comprised 94 percent of the total potentially affected minority population. Moving outward from TA-55, minority populations increase most noticeably near the outskirts of Española, Santa Fe, and Albuquerque. More than one-half of the potentially affected Hispanic or Latino population lived in the Española-Santa Fe area in the year 2000.

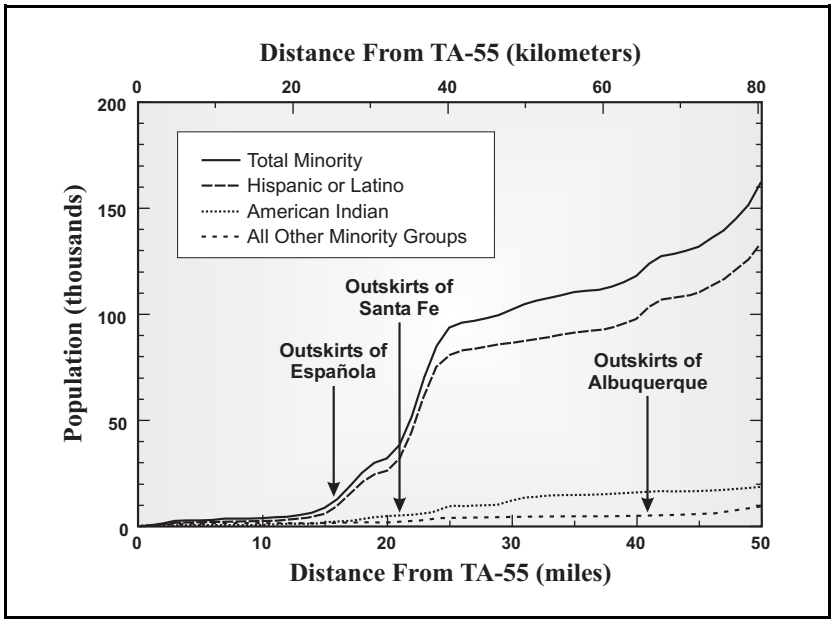

Figure D–7 Minority Populations as a Function of Distance from TA-55

As shown in **Table D–3**, approximately 162,000 minority individuals lived within 50 miles (80 kilometers) of TA-55 in the year 2000. Eighty-six percent of the potentially affected minority population was resident in three of the eight potentially affected counties: Rio Arriba, Sandoval, and Santa Fe Counties.

Table D–3 Minority Populations Living in Potentially Affected Counties Surrounding TA-55 in the Year 2000

County	*Total Minority Population*	*Potentially Affected Minority Population*	*Percentage of the Totally Affected Minority Population*
Bernalillo	285,081	12,432	7.7
Los Alamos	3,235	3,235	2.0
Mora	4,293	172	0.1
Rio Arriba	35,404	30,297	18.7
San Miguel	24,332	3,395	2.1
Sandoval	44,165	41,375	25.6
Santa Fe	69,713	67,746	41.8
Taos	19,597	3,244	2.0
Total	485,820	161,896	100.0

D.4.2.2 Low-Income Populations Surrounding TA-55

Figure D–8 shows the counties at radiological risk from CMR operations that would be conducted at TA-55. Low-income and non-low-income populations living within 50-miles (80-kilometers) are shown as a bar graph for each potentially affected county. Eighty-six percent of the potentially affected low-income population lives in three of the eight potentially affected counties: Rio Arriba, Sandoval, and Santa Fe (see **Table D–4**). Among the 33 counties in New Mexico, 4 of the potentially affected counties have the lowest percentages of their population with incomes below the poverty threshold: Bernalillo, Los Alamos, Sandoval, and Santa Fe.

Table D–4 Low-Income Populations Surrounding TA-55 by County

County	*Rank Among All New Mexico Counties (lowest percent poverty among the total county population)*	*Number of Low-Income Persons in County in 2000*	*Low-Income Population at Risk in 2000*	*Percent of the Total Low-Income Population at Risk*
Bernalillo	4	74,987	1,975	5.6
Los Alamos	1	543	543	1.5
Mora	28	1,305	293	0.8
Rio Arriba	18	8,303	6,495	18.3
San Miguel	25	7,110	920	2.6
Sandoval	3	10,847	9,168	25.8
Santa Fe	2	15,241	14,757	41.6
Taos	19	6,232	1,356	3.8

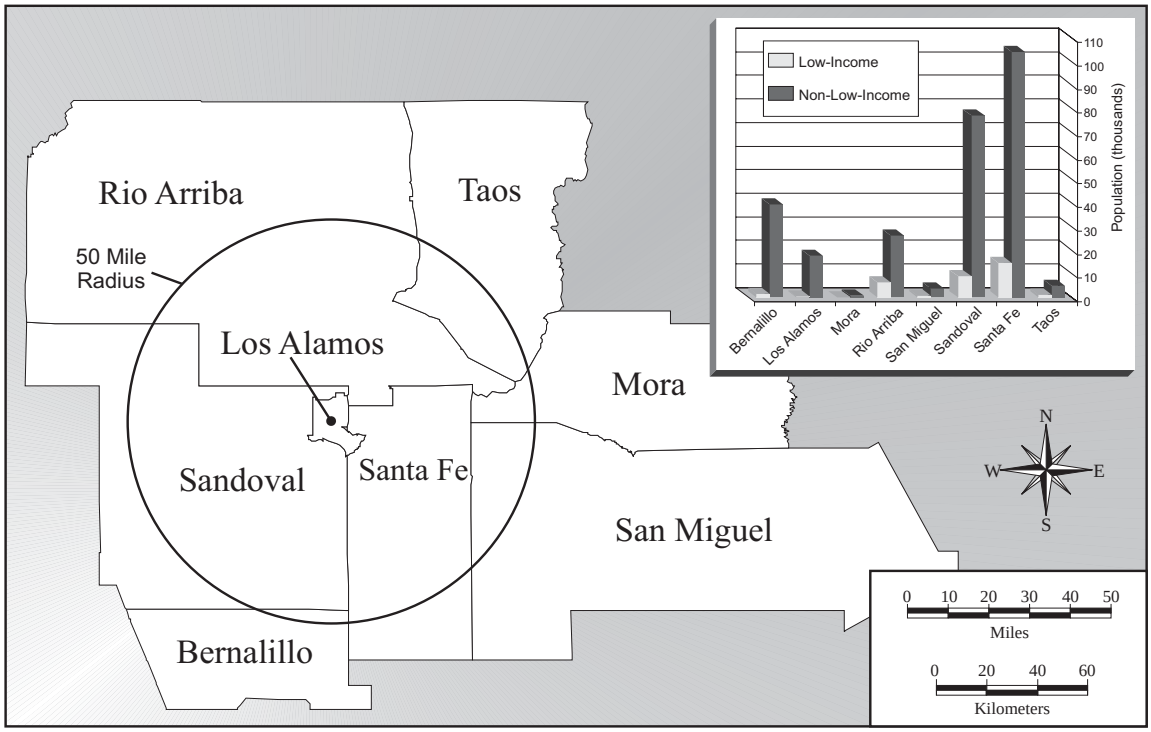

Figure D–8 Low-Income and Non-Low-Income Populations Living in Potentially Affected Counties Surrounding TA-55

Figure D–9 shows the low-income population surrounding TA-55 as a function of distance from TA-55. Moving outward from this location, low-income populations increase most noticeably near the outskirts of Española, Santa Fe, and Albuquerque. Approximately one-half of the low-income population lives within 24 miles (39 kilometers) of TA-55.

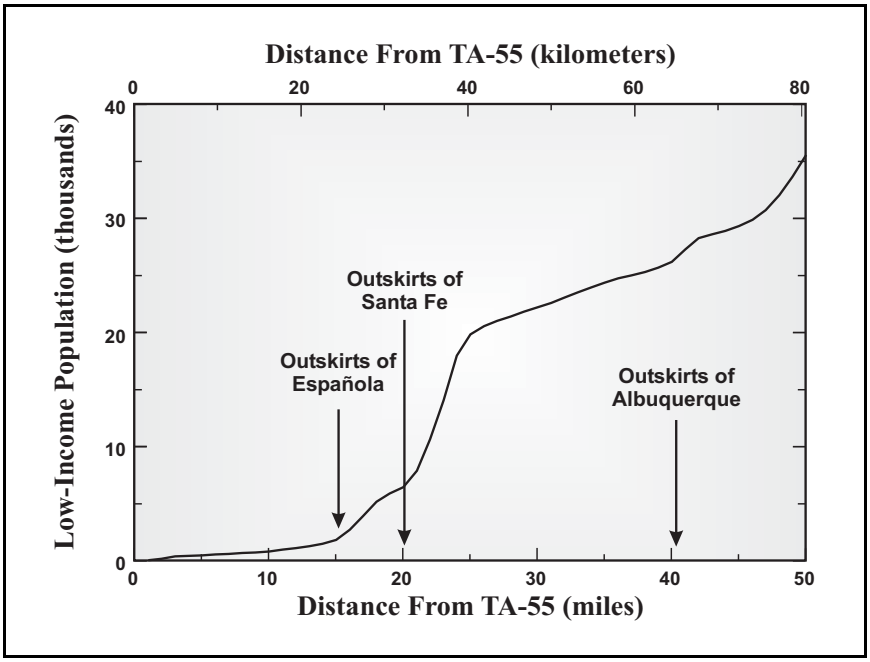

Figure D–9 Low-Income Population as a Function of Distance from TA-55

D.4.2.3 Impacts of Alternatives 1 and 3 on Low-Income and Minority Populations Surrounding TA-55

Construction

Under Alternative 1 (Preferred Alternative), a new administrative offices and support functions building and laboratory building(s) would be constructed at TA-55. Alternative 3 is similar, except that the existing CMR Building would continue to house administrative offices and support functions activities with only new laboratory building(s) being constructed at TA-55. As discussed throughout Sections 4.3 and 4.5, environmental impacts due to construction would be temporary and would not extend beyond the boundary of LANL. Under Alternatives 1 and 3, construction at TA-55 would not result in adverse environmental impacts to members of the public living within the potentially affected area surrounding TA-55, including low-income and minority populations.

Normal Operations

As discussed in Sections 4.3.9.1 and 4.5.9.1, under Alternatives 1 and 3, the likelihood of a cancer fatality to the maximally exposed offsite individual from normal operations at the new CMRR Facility would be less than approximately 1 chance in 6 million for each year of exposure. The risk of a latent cancer fatality occurring among the population surrounding the CMRR Facility at TA-55 would be approximately 1 chance in 1,000 for each year of exposure. Under normal operating conditions, the dose from radiological emissions from the CMRR Facility at TA-55 would be a factor of 700 less than the dose from background radiation present in the potentially affected area surrounding TA-55. Also, during normal operations under Alternatives 1 and 3, chemical releases to the atmosphere would be less than EPA screening thresholds (40 CFR 68) used to designate a hazard to human health.

Thus, normal operations under Alternatives 1 and 3 would pose no adverse risk to minority and low-income populations residing in the potentially affected area surrounding the CMRR Facility at TA-55. In addition, the special pathways analysis described in Section D.4.4 shows that CMR operations would not pose an adverse risk to American Indians or others who depend upon subsistence hunting, fishing, and gathering.

Radiological and Chemical Accidents

The risks to the public from potential accidents under Alternatives 1 and 3 are discussed in Section 4.3.9.2 and presented in Table 4–15. A facility-wide spill would result in the largest radiological consequences for the public and the maximally exposed offsite individual. These risks are approximately 1 chance in 238 of causing a latent cancer fatality (0.0042 latent cancer fatalities) in the total population. Thus, for the accidents evaluated in this EIS under Alternatives 1 and 3, no latent cancer fatalities among the public would be expected to result from any of these accidents, including minority or low-income persons.

Quantities of toxic and carcinogenic chemicals that would be used and stored in the CMRR Facility at TA-55 under Alternatives 1 and 3 are less than EPA screening thresholds (40 CFR 68)

that would pose a hazard to human health. Accidents that could occur at the CMRR Facility under Alternatives 1 and 3 would not pose a chemical release hazard to the public, including minority and low-income persons.

Waste Generation and Management

As discussed in Sections 4.3.11 and 4.5.11, waste generated under Alternatives 1 and 3 would be managed under the existing waste management system at LANL. All waste generated would be within LANL's capacity for handling waste.

In summary, CMR operations under Alternatives 1 and 3 would not be expected to adversely affect air or water quality, or to result in contamination of Tribal lands adjacent to the LANL boundary. Implementation of Alternatives 1 and 3 would not pose disproportionately high or adverse environmental risks to low-income or minority populations living in the potentially affected area surrounding the CMRR Facility at TA-55.

D.4.3 Results for Action Alternatives 2 and 4

Under Alternatives 2 and 4, new laboratory building(s) would be constructed at TA-6 to house analytical chemistry and materials characterization activities that are currently conducted at the existing CMR Building. Under Alternative 2, a new administrative offices and support functions building would also be constructed at TA-6 and the existing CMR Building would be partly or totally dispositioned. Under Alternative 4, the existing CMR Building would continue to house administrative offices and support functions for CMR operations. This section describes the low-income and minority populations living within the potentially affected area surrounding TA-6. It also describes the potential environmental impacts on those populations that could result from implementation of Alternatives 2 and 4.

D.4.3.1 Minority Populations Surrounding TA-6

Figure D–10 shows the potentially affected area centered on the proposed location for a new CMRR Facility at TA-6. It shows the counties at radiological risk and the composition of the population at risk in each county. The "population at risk" refers to all persons who reside within 50 miles (80 kilometers) of the new CMRR Facility. The 50-mile (80-kilometer) distance was selected to correspond to the radius-of-effects for potential radiological health impacts. The counties at radiological risk are the same as those discussed under the No Action Alternative and Action Alternatives 1 and 3: Bernalillo, Los Alamos, Mora, Rio Arriba, Sandoval, San Miguel, Santa Fe, and Taos.

Minority and non-minority populations living within the 50-mile (80-kilometer) distance from TA-6 are shown as a bar graph for each potentially affected county.

Figure D–11 shows the composition of the minority population as a function of distance from TA-6. The combined Hispanic or Latino and American Indian populations comprised 94 percent of the total potentially affected minority population. Moving outward from TA-6, minority populations increase most noticeably near the outskirts of Española, Santa Fe, and Albuquerque.

More than one-half of the potentially affected Hispanic or Latino population lived in the Española-Santa Fe area in the year 2000.

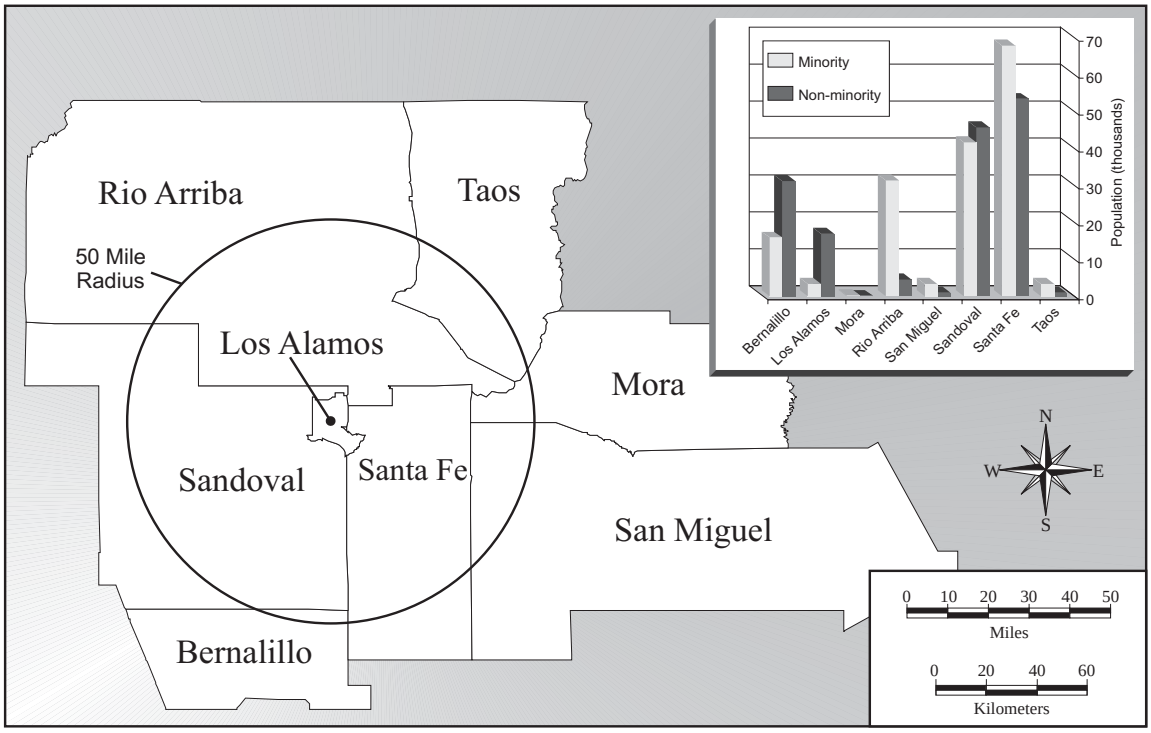

Figure D–10 Minority and Non-Minority Populations Living in Potentially Affected Counties Surrounding TA-6

As shown in **Table D–5**, approximately 165,000 minority individuals lived within 50 miles (80 kilometers) of TA-6 in the year 2000. Eighty-five percent of the potentially affected minority population was resident in three of the eight potentially affected counties: Rio Arriba, Sandoval, and Santa Fe Counties.

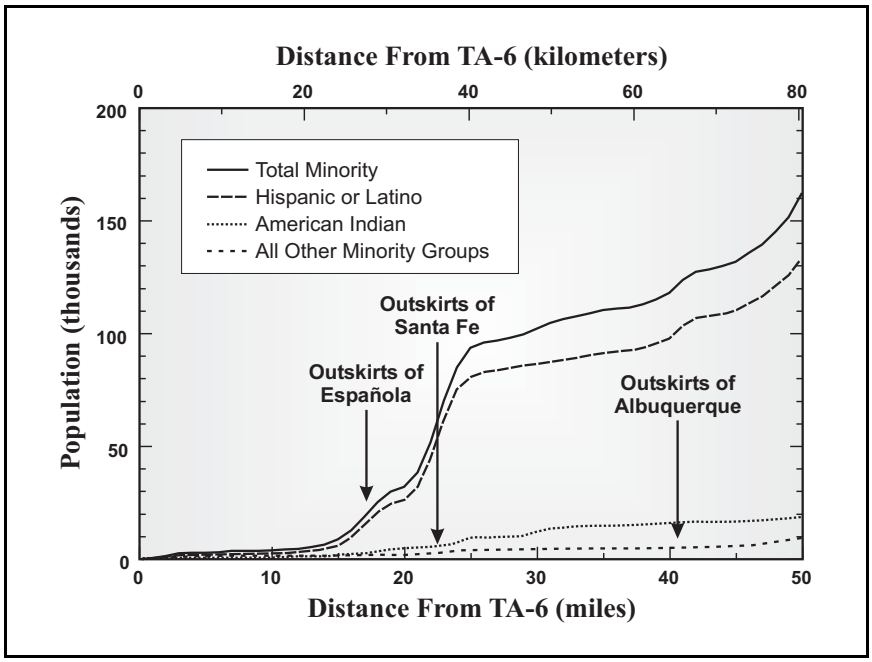

Figure D–11 Minority Populations as a Function of Distance from TA-6

Table D–5 Minority Populations Living in Potentially Affected Counties Surrounding TA-6 in the Year 2000

County	*Total Minority Population*	*Potentially Affected Minority Population*	*Percentage of the Totally Affected Minority Population (percent)*
Bernalillo	285,081	14,999	9.1
Los Alamos	3,235	3,235	2.0
Mora	4,293	111	0.1
Rio Arriba	35,404	30,302	18.4
San Miguel	24,332	3,259	2.0
Sandoval	44,165	41,688	25.3
Santa Fe	69,713	67,712	41.2
Taos	19,597	3,161	1.9
Total	485,820	164,467	100.0

D.4.3.2 Low-Income Populations Surrounding TA-6

Figure D–12 shows the counties at radiological risk from CMR operations that would be conducted at TA-6. Low-income and non-low-income populations living within 50-miles (80-kilometers) are shown as a bar graph for each potentially affected county. Eighty-five percent of the potentially affected low-income population lives in three of the eight potentially affected counties: Rio Arriba, Sandoval, and Santa Fe (see **Table D–6**). Among the 33 counties in New Mexico, 4 of the potentially affected counties have the lowest percentages of their population with incomes below the poverty threshold: Bernalillo, Los Alamos, Sandoval, and Santa Fe.

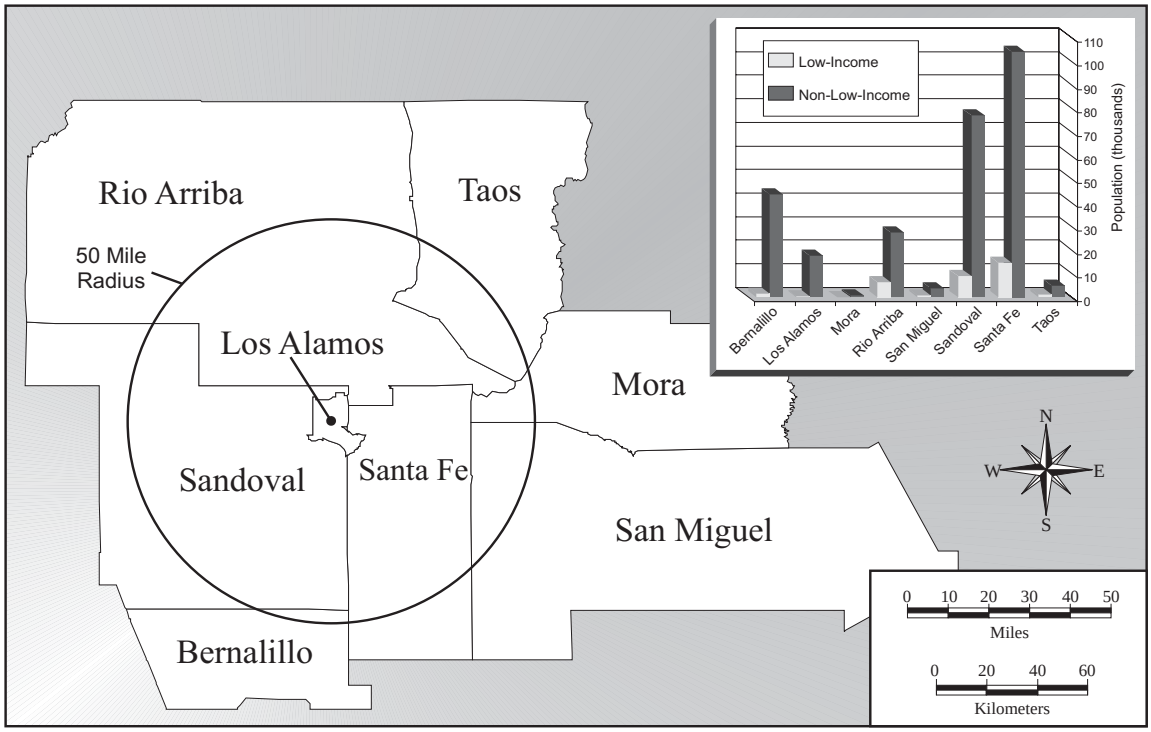

Figure D–12 Low-Income and Non-Low-Income Populations Living in Potentially Affected Counties Surrounding TA-6

Table D–6 Low-Income Populations Surrounding TA-6 by County

County	*Rank Among All New Mexico Counties (lowest percent poverty among the total county population)*	*Number of Low-Income Persons in County in 2000*	*Low-Income Population at Risk in 2000*	*Percent of the Total Low-Income Population at Risk*
Bernalillo	4	74,987	2,319	6.5
Los Alamos	1	543	543	1.5
Mora	28	1,305	261	0.7
Rio Arriba	18	8,303	6,503	18.1
San Miguel	25	7,110	847	2.4
Sandoval	3	10,847	9,292	26.0
Santa Fe	2	15,241	14,747	41.3
Taos	19	6,232	1,236	3.5

Figure D–13 shows the low-income population surrounding TA-6 as a function of distance from TA-6. Moving outward from this location, low-income populations increase most noticeably near the outskirts of Española, Santa Fe, and Albuquerque. Approximately one-half of the low-income population lives within 25 miles (40 kilometers) of TA-6.

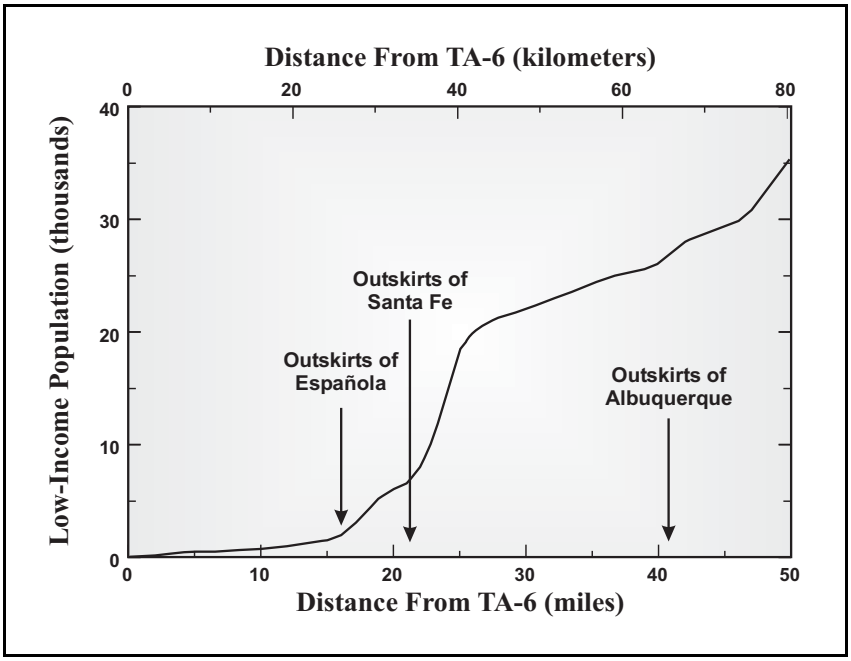

Figure D–13 Low-Income Population as a Function of Distance from TA-6

D.4.3.3 Impacts of Alternatives 2 and 4 on Low-Income and Minority Populations Surrounding TA-6

Construction

Under Alternative 2, a new administrative offices and support functions building and laboratory building(s) would be constructed at TA-6. Alternative 4 is similar, except that the existing CMR Building would continue to house administrative offices and support functions activities with only new laboratory building(s) being constructed at TA-6. As discussed throughout Sections 4.4 and 4.6, environmental impacts due to construction would be temporary and would not extend beyond the boundary of LANL. Under Alternatives 2 and 4, construction at TA-6

would not result in adverse environmental impacts to members of the public living within the potentially affected area surrounding TA-6, including low-income and minority populations.

Normal Operations

As discussed in Sections 4.4.9.1 and 4.6.9.1, under Alternatives 2 and 4, the likelihood of a cancer fatality to the maximally exposed offsite individual from normal operations at the new CMRR Facility would be less than approximately 1 chance in 5.6 million for each year of exposure. The risk of a latent cancer fatality occurring among the population surrounding the CMRR Facility at TA-6 would be approximately 1 chance in 1,000 for each year of exposure. Under normal operating conditions, the dose from radiological emissions from the CMRR Facility would be a factor of 700 less than the dose from background radiation present in the potentially affected area. Also, during normal operations under Alternatives 2 and 4, chemical releases to the atmosphere would be less than EPA screening thresholds (40 CFR 68) that designate a hazard to human health.

Thus, normal operations under Alternatives 2 and 4 would pose no adverse risk to minority and low-income populations residing in the potentially affected area surrounding the CMRR Facility at TA-6. In addition, the special pathways analysis described in Section D.4.4 shows that CMR operations would not pose an adverse risk to American Indians or others who depend upon subsistence hunting, fishing, and gathering.

Radiological and Chemical Accidents

The risks to the public from potential accidents under Alternatives 2 and 4 are discussed in Section 4.3.9.2 and presented in Table 4–25. A severe facility-wide spill would result in the largest radiological consequences for the public and the maximally exposed offsite individual. These risks are approximately 1 chance in 250 of causing a latent cancer fatality (0.004 latent cancer fatalities) in the total population. Thus, for beyond design basis accidents evaluated in this EIS under Alternatives 2 and 4, no latent cancer fatalities among the public would be expected to result from any of these accidents, including minority or low-income persons.

Quantities of toxic and carcinogenic chemicals that would be used and stored at the CMRR Facility at TA-6 under Alternatives 2 and 4 are less than EPA (40 CFR 68) screening thresholds used to designate hazards to human health. Accidents that could occur at the CMRR Facility under Alternatives 2 and 4 would not pose a chemical release hazard to the public, including minority and low-income persons.

Waste Generation and Management

As discussed in Sections 4.4.11 and 4.6.11, waste generated under Alternatives 2 and 4 would be managed under the existing waste management system at LANL. All waste generated would be within LANL's capacity for handling waste.

In summary, CMR operations under Alternatives 2 and 4 would not be expected to adversely affect air or water quality, or to result in contamination of Tribal lands adjacent to the LANL

boundary. Implementation of Alternatives 2 or 4 would not pose disproportionately high or adverse environmental risks to low-income or minority populations living in the potentially affected area surrounding the CMRR Facility at TA-6.

D.4.4 Special Pathways Analysis

As shown in Figures D–3, D–7, and D–11, minority populations surrounding the existing CMR Building and the proposed locations for the CMRR Facility at TA-55 and TA-6 are comprised largely of Hispanics and American Indians. Radiological health impacts discussed in Chapter 4 and Appendix B of this EIS consider the exposure of the general public to external radiation, inhalation of airborne radioactive materials and hazardous chemicals, ingestion of contaminated water and food, and the inadvertent ingestion of contaminated soils. Special exposure pathways such as the ingestion of radiologically contaminated herbal teas, game, and fish could have additional impacts on American Indians or others who depend on subsistence hunting, fishing, and gathering. An evaluation of health impacts that could arise from the ingestion of contaminated food through special pathways was performed during preparation of the *LANL SWEIS* (DOE 1999; Appendix D, Section D.2). It found that ingestion risks from special pathways were the same for all alternatives evaluated in the *LANL SWEIS* (including the Expanded Operations Alternative) because most of the ingestion risk is attributable to existing levels of radiological contamination in water and soils local to the Los Alamos area (DOE 1999, Section 5.3.6.1). **Table D–7** summarizes the results of the special pathways analysis. The annual dose to exposed individuals resulting from the ingestion of local fish, elk, piñon nuts, and herbal tea brewed from locally grown plants was estimated to be approximately 3.2 millirem. The associated radiological risk would be approximately 1 chance in 620,000 of an exposed individual contracting a fatal cancer for each year of exposure. Since the operational characteristics of the CMRR Facility are based on the level of CMR operations required to support the *LANL SWEIS* Expanded Operations Alternative and the ingestion risk is the same for all of the alternatives evaluated in the *LANL SWEIS*, CMR operations would not be expected to pose an adverse risk to American Indians or others who depend on subsistence hunting, fishing, and gathering.

Table D–7 Worst-Case Public Radiological Dose and Potential Consequences by Ingestion Pathways for Special Pathways Receptors, All Alternatives [a]

Exposure Pathway	*Special Pathways Receptors* [b]	
	Dose (millirem per year)	*Chance of an Excess Latent Cancer Fatality Per Year*
Fish	0.46	1 in 4,300,000
Elk heart and liver	0.034	1 in 59,000,000
Piñon nuts	0.13	1 in 15,000,000
Indian tea (cota)	2.60	1 in 770,000
Total	3.22	1 in 620,000

[a] Because almost all public ingestion is from naturally-occurring radionuclides, weapons testing fallout, and contamination from past operations, the ingestion dose is not affected by the alternatives (DOE 1999, Section 5.1.6).

[b] Special pathways receptors are those with traditional Native American or Hispanic lifestyles.

D.5 REFERENCES

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